

# Memorandum

**Prepared by:** Dr. Larry Dyck, PhD, William A. Stephens, P.E., Christopher Suttell, P.G.

**Date:** March 30, 2011

**Subject:** Report for PCB Sampling of Floodplain Sediments Exposed After Dredging and the Lowering of Water Levels Upstream of the Former Woodside I Dam at the Twelve Mile River

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This memorandum summarizes sediment sampling for PCBs from a bank along the exposed floodplain upstream of the former Woodside I dam. In addition, it provides a preliminary estimate of the volume of sediment and the amount of PCB contamination within the reach of the Woodside I and II dams.

Ten sediment samples were collected and analyzed as part of a limited investigation conducted and directed by the Pickens Soil and Water Conservation District, the Lake Hartwell Association, Upstate Forever and Kestrel Horizons, LLC and funded by Upstate Forever. This investigation is not directly part of study relating to the Easley-Central Water District dam; the results of that study should be available by the end of next month.

## **Sample Location, Strategy, and Methodology**

On February 19, 2011, Dr. Larry Dyck and representatives from Kestrel (including Harry Morris, a Registered South Carolina Professional Geologist) collected ten sediment samples on an approximate 150 foot stretch of river upstream of the Woodside I dam on the north side of the river. The work was performed with permission of the property owner, Mrs. Nelle Ball. The sampling locations are presented on Figure 1.

Fine-grained materials were targeted for the samples because previous sediment sampling indicated that PCBs tend to accumulate in sediments comprised of fine-grained material as opposed to coarser grained material. Five of the ten sediment samples (BK-1, BK-2, BK-3, BK-4, and BK-5) were collected from a layer of fine grained materials that outcropped on the steep slopes of the floodplain bank that were exposed following dredging of the channel and partial lowering of the water level prior to removal of the Woodside I dam. One sediment sample, BK-4U, was collected from a sedimentary layer atop the layer discussed above and contained more sandy material. The four remaining samples (BK-0S, BK-1S, BK-3S, and BK-5S) were collected from a narrow backwater swale on top of this floodplain bank, which contained some fine-grained organic materials but was comprised predominantly of sandy material.

Samples were analyzed for PCB content using EPA Method 8082A by Shealy Environmental Laboratories, Inc. in Cayce, S.C. The sediment samples were collected



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To say the least, these findings are highly alarming. There is now every reason to believe that other flood plain sediments above the Woodside II dam contain excessive levels of PCBs. If Schlumberger is allowed to complete its inadequate dredging operation and to remove the Woodside II dam, there is a grave risk that massive amounts of PCB-contaminated sediments will move downstream and settle out into Lake Hartwell. Instead of clean sediments being deposited over the contaminated ones, which is the basic goal of the remedy chosen by the EPA, we will witness the accumulation of even more contaminated sediments and the loss of all hope for the end of the fish consumption warnings in Lake Hartwell.

For these reasons, we respectfully request that:

1. A hearing to consider the results of this sampling be scheduled as soon as possible;
2. Because the trustees have taken the position that only EPA has jurisdiction to address the issue of contaminated sediments, EPA should be ordered to attend the hearing; and
3. Schlumberger should be required to remove and properly dispose of virtually all of the sediment in and along Twelve Mile River before any steps are taken to remove the Woodside II dam.

Thank you for your continuing assistance in this important case.

Very truly yours,

*Rita Bolt Barker*

Rita Bolt Barker  
(864) 242-8235  
[rbarker@wyche.com](mailto:rbarker@wyche.com)

RBB:sc

Enclosure

cc: The Honorable William W. Wilkins w/encl.  
Leon C. Harmon w/encl.  
Representatives of Natural Resource Trustees w/encl.  
All Counsel of Record w/encl.  
Craig Zeller, U.S. Environmental Protection Agency w/encl.

in a manner consistent with EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Documentation of field activities was completed using bound logbooks. Chain of custody records will be provided in the final analytical report after Level IV data validation is completed. It is highly unlikely that the sampling results will be affected by Level IV validation.

### Sample Results and Discussion

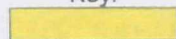
PCBs were detected in each of the ten samples. Five of the six samples collected from the bank with the fine-grained materials had PCB concentrations far in excess of one part per million (ppm), which is the sediment cleanup goal for PCBs ordinarily used by S.C. DHEC and the U.S. EPA. **The highest PCB concentration of 54 ppm detected in sediment sample BK-5 is the highest known concentration of total PCBs ever detected upstream of the Woodside II dam and is among the highest ever recorded within the entire Lake Hartwell Watershed (EPA's Operational Unit 2).** The samples collected from the backwater swale above the exposed bank were below one ppm.

The analytical results for the samples are summarized below, in Table 1.

Table 1

Sample Location	Sample Date	Total PCBs (mg/kg)
BK-1	02/20/11	10.650
BK-2	02/20/11	9.670
BK-3	02/20/11	17.700
BK-4	02/20/11	28.500
BK-5	02/20/11	54.000
BK-4U	02/20/11	< 0.450
BK-0S	02/20/11	< 0.800
BK-1S	02/20/11	< 0.510
BK-3S	02/20/11	< 0.690
BK-5S	02/20/11	< 0.680

Key:



Greater than 1 mg/kg

< = Less than listed concentration

### Fate and Estimated Quantity of Contaminated Sediments

Visual observation of the banks above the Woodside I dam during and after dam removal confirmed that bedrock does not extend to the edge of the river shoreline as depicted in the final plans prepared by Arcadis for the Twelve Mile River Restoration Project, which form the basis of approvals by the Natural Resource Trustees as well as by S.C. DHEC, the U.S. Army Corps of Engineers, and Pickens County. Instead, significant quantities of floodplain sediment extend along large portions of the river shoreline to unknown depths terminating at bedrock. As shown in the photographic log presented as Attachment A, a dramatic change in the shoreline occurred after the February 19, 2011 PCB sampling event. The photographic log confirms that floodplains

are eroding rapidly as water levels change in the un-impounded river. These photographs combined with the sampling results clearly indicate that significant quantities of PCB-laden sediments have not been removed from the river and that PCB-laden sediments have mobilized downstream, possibly into Lake Hartwell.

Preliminary estimates of sediment volume and total PCB content were calculated. The estimates are based on re-interpretations of two Arcadis cross-sections that were considered representative of typical cross-sections of the river channel within the Woodside I and II pools. The reinterpretations may more appropriately represent actual site conditions with regard to floodplain sediment thickness and bedrock elevations. Our estimates suggest floodplains contain between approximately 220,000 to 260,000 cubic yards of sediment within the reach of the Woodside I and II dams. Assuming fine-grained material comprises approximately 15 to 20% percent of floodplain sediments, and the average total PCB concentration is between 10 to 20 mg/kg, then we estimate that unexcavated floodplains contain between 66 to 210 gallons of pure PCB fluid, which is equivalent to the PCBs that would be contained in 132,000 to 420,000 gallons of PCB dielectric fluid at 500 ppm. This contamination may affect between 33,000 to 52,000 cubic yards of fine-grained sediments within the floodplains.

### **Purpose, Conclusions, and Recommendations**

This investigation was conducted because of serious concern that:

- A. Impoundment induced floodplain sediments are contaminated with PCBs;
- B. The magnitude of impoundment-induced floodplains (and their PCB contamination) has been seriously underestimated;
- C. Cross-sections along river transects provided in the Arcadis Final Design Report incorrectly depict the size and scope of floodplains and the location of associated protective bedrock;
- D. Upon removal of the Woodside dams, impoundment-induced floodplains will erode and release vast quantities of PCB-contaminated floodplain sediments downstream;
- E. Release of PCBs from floodplains will contaminate Lake Hartwell and undermine the Natural Recovery process mandated by the 1994 Record of Decision and supported by the U.S. EPA.

The condition and extent of the floodplain sediments, together with the sampling results, indicate that the floodplain sediments pose a significant risk to human health, aquatic life, and the environment.

Based on these results and the results of last year's sampling of the lower floodplain sediments above the Easley-Central Water District dam, it is our opinion and recommendation that work by Schlumberger on the project should be immediately suspended and that a modified restoration plan should be established and implemented that will adequately protect public health and the environment and that will achieve the restoration goals of the Consent Decree.



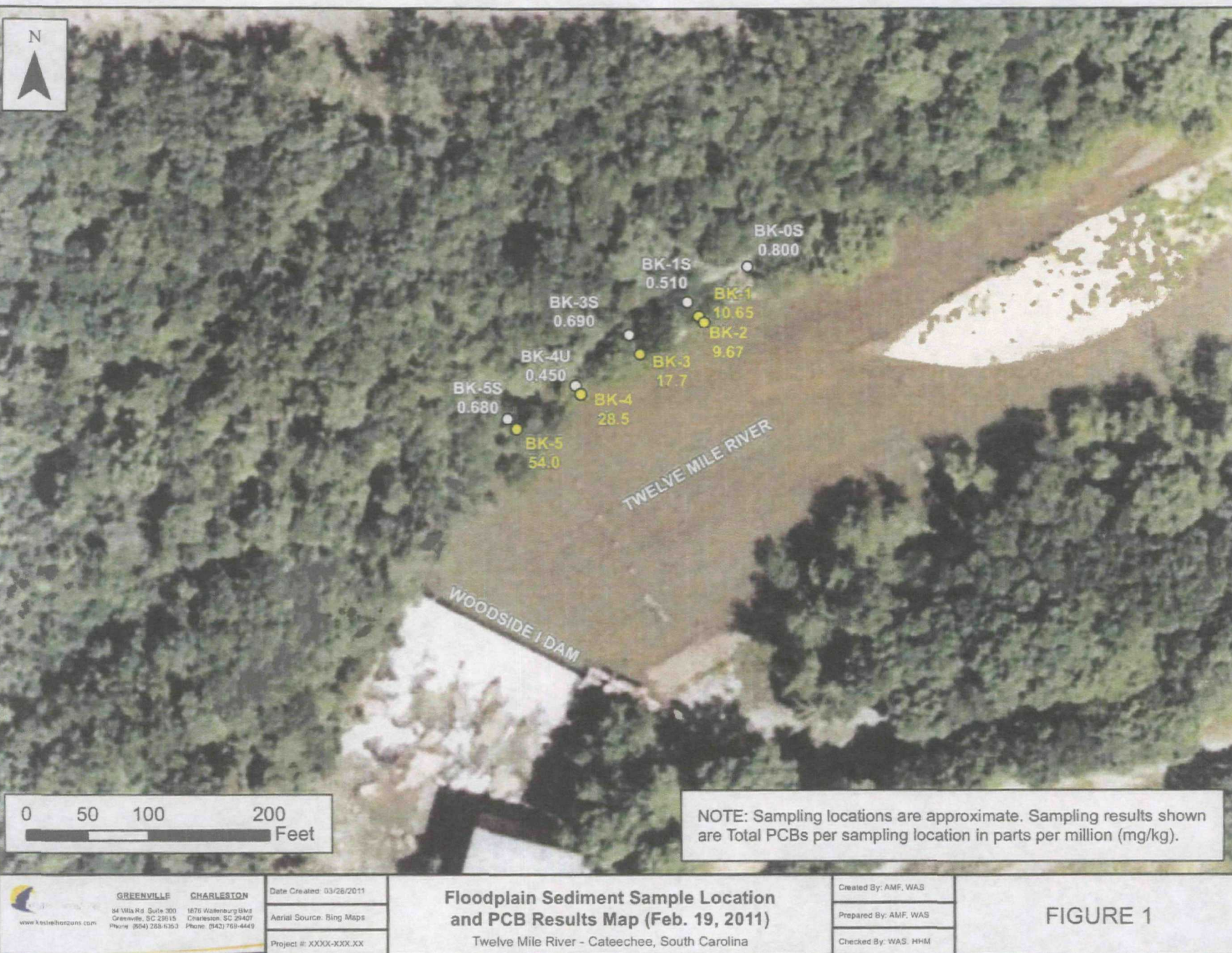




Photo 1: North floodplain terrace bank located just upstream of Woodside I Dam; water in the impoundment had been lowered about 10 feet and revealed banks interbedded with strata comprised of sand (tan color) and fine-grained (dark colored) material. Photo made Feb. 1, 2011





Photo 2: Sediment sampling activities on the north floodplain terrace bank, just upstream of the Woodside I Dam. Sampling focused on the dark, fine grained sediment; sampling visible in the lower left. Photo made Feb. 19, 2011





Photo 3: Bank along the north floodplain terrace, located just upstream of Woodside I Dam; note the dark, fine grained sediment layer located within sandy (tan) bank. Photo taken Feb. 19, 2011.





Photo 4: Bank along the north floodplain terrace, located just upstream of Woodside I Dam; stainless steel sampling-spoon is adjacent to fine grained sediment that was sampled for PCBs. Photo taken Feb. 19, 2011.





Photo 5: Bank of north floodplain terrace, located just upstream of Woodside I Dam. Force of the river following heavy rain has undercut the sandy bank causing the upland plateau to collapse into the river. Strata sampled on Feb. 19, 2011 have washed away. Photo taken on March 16, 2011.





Photo 6: View of the river behind the former Woodside I Dam, after the dam has been removed. South floodplain (on the right) is collapsing during flow that followed a heavy rain (note trees have fallen into the river as banks collapsed). Photo taken March 17, 2011



Photo 7: View of river behind Woodside I Dam, after the dam has been removed. The exposed bank from the large south floodplain reveals dark strata (arrows). Strata are similar in appearance to those sampled for PCBs. Photo taken March 17, 2011





Photo 8: View of water leaving the project boundary, passing over the Woodside II Dam. Water contains an unusually heavy sediment load. Much of the sediment load is from upstream of Woodside I. It represents scour of residual sediment left in the river channel after dredging was terminated and erosion of the floodplain banks exposed after the dam was removed.

Photo taken March 17, 2011.